



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/827,064	04/19/2004	Cyril Cabral, JR.	YOR919990509US3 (13171AB)	2363
23389	7590	03/29/2006	EXAMINER DOTY, HEATHER ANNE	
SCULLY SCOTT MURPHY & PRESSER, PC 400 GARDEN CITY PLAZA SUITE 300 GARDEN CITY, NY 11530			ART UNIT 2813	
PAPER NUMBER				

DATE MAILED: 03/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/827,064	CABRAL, ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Heather A. Doty	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 January 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 24,25 and 28-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 32 and 33 is/are allowed.
- 6) ☒ Claim(s) 24,25 and 28-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

Applicant's arguments regarding the rejection of claims 31 and 32 under 35 U.S.C. 112 are persuasive. The rejection is hereby withdrawn.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 24, 25, and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Legoues et al. (US 5,810,924), assigned to the same assignee as the instant application, in view Besser et al. (US 6,165,903) and Rosvold (U.S. 3,855,612).

Regarding claim 24, Legoues et al. discloses an electrical contact to a region of a silicon-containing substrate comprising, a substrate having an exposed region of a silicon-containing semiconductor material (paragraph bridging cols. 5-6); and a first layer of Ni silicide, wherein said substrate and said first layer are separated by a Si-Ge interlayer 12 (col. 6, lines 6-24; paragraph bridging cols.14-15).

Legoues et al. does not indicate that the nickel silicide is nickel monosilicide (NiSi) or that the nickel monosilicide comprises at least one of the claimed additives.

Besser et al. teaches that it is known in the art that NiSi, by contrast to the disilicides of Ti and Co (TiSi<sub>2</sub> and CoSi<sub>2</sub>), is the low-resistivity phase of nickel silicide (col. 1, lines 22-30).

It would have been obvious for one of ordinary skill in the art, at the time of the invention, to use nickel monosilicide as the nickel silicide in Legoues et al. because it is the low-resistivity phase of the nickel silicide, as taught to be well known in the art by Besser et al.

Rosvold teaches forming nickel silicide comprising platinum as an additive (52 in Fig. 6; column 5, lines 24-47) on a silicon substrate (column 3, lines 33-38), to form a contact with low resistance (column 7, lines 10-12) that operates very effectively with either gold or aluminum bonding systems (column 7, lines 46-48). Rosvold discloses that the Ni(Pt)Si ternary has a composition that is approximately 50% silicon, 45% nickel, and 5% platinum (column 5, lines 33-43), indicating that nickel monosilicide with small amounts of platinum additive is the silicide formed by Rosvold's process.

Therefore, at the time of the invention, it would have been obvious to one of ordinary skill in the art to combine the teachings of Besser et al. and Legoues et al. with the teachings of Rosvold to add an additive such as platinum to nickel monosilicide to form an electrical contact. The motivation for doing so at the time of the invention would have been that such a silicide offers low contact resistance and operates effectively with either gold or aluminum bonding systems, as expressly taught by Rosvold.

Regarding claim 25, Legoues et al. discloses the electrical contact of claim 24 wherein said silicon-containing semiconductor material comprises, *inter alia*, single-crystal Si and SiGe (paragraph bridging cols. 5-6).

Regarding claims 28-30, Legoues et al. discloses a p-i-n diode 25, therefore the substrate necessarily includes a doped p+ and n+ regions. While the nomenclature "+"

is not used, the "+" is a relative term of degree and does not have patentable weight absent a specifically claimed amount.

Regarding claim 31, Legoues et al., Besser et al., and Rosvold together teach the electrical contact of claim 24 wherein one additive is Pt (see 35 USC 103(a) rejection of claim 24 above).

Claims 24, 25, and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshimi et al. (US 5,698,869) in view of Besser et al. (U.S. 6,165,903) and Rosvold (U.S. 3,855,612).

Regarding claim 24, Yoshimi et al. discloses an electrical contact to a region of a silicon-containing substrate comprising, a substrate **201** having an exposed region of a silicon-containing semiconductor material (Fig. 14); and a first layer of Ni silicide **74**, wherein said substrate and said first layer are separated by a Si-Ge interlayer **47** (Fig. 14, paragraph bridging cols. 19-20, col. 20, lines 50-60, and col. 21, lines 50-54).

Yoshimi et al. does not indicate that the nickel silicide is nickel monosilicide (NiSi) or that the nickel monosilicide comprises at least one of the claimed additives.

Besser et al. teaches that it is known in the art that NiSi, by contrast to the disilicides of Ti and Co (TiSi<sub>2</sub> and CoSi<sub>2</sub>), is the low-resistivity phase of nickel silicide (col. 1, lines 22-30).

It would have been obvious for one of ordinary skill in the art, at the time of the invention, to use nickel monosilicide as the nickel silicide in Yoshimi et al. because it is the low-resistivity phase of the nickel silicide, as taught to be well known in the art by Besser et al.

Rosvold teaches forming nickel silicide comprising platinum as an additive (52 in Fig. 6; column 5, lines 24-47) on a silicon substrate (column 3, lines 33-38), to form a contact with low resistance (column 7, lines 10-12) that operates very effectively with either gold or aluminum bonding systems (column 7, lines 46-48). Rosvold discloses that the Ni(Pt)Si ternary has a composition that is approximately 50% silicon, 45% nickel, and 5% platinum (column 5, lines 33-43), indicating that nickel monosilicide with small amounts of platinum additive is the silicide formed by Rosvold's process.

Therefore, at the time of the invention, it would have been obvious to one of ordinary skill in the art to combine the teachings of Besser et al. and Yoshimi et al. with the teachings of Rosvold to add an additive such as platinum to nickel monosilicide to form an electrical contact. The motivation for doing so at the time of the invention would have been that such a silicide offers low contact resistance and operates effectively with either gold or aluminum bonding systems, as expressly taught by Rosvold.

Regarding claim 25, Yoshimi et al. discloses the electrical contact of claim 24 wherein said silicon-containing semiconductor material comprises, *inter alia*, silicon-on-insulator (SOI) (col. 19, lines 50-54).

Regarding claims 28-30, Yoshimi et al. discloses the electrical contact of claim 24 wherein said substrate 201 is p-type doped (Fig. 14; col. 19, lines 50-54) and therefore includes p+ doped regions. The substrate also includes n+ regions 206 (Fig. 4A). While the nomenclature "p+" is not used, the "+" is a relative term of degree and does not have patentable weight absent a specifically claimed amount.

Art Unit: 2813

Regarding claim 31, Regarding claim 31, Yoshimi et al., Besser et al., and Rosvold together teach the electrical contact of claim 24 wherein one additive is Pt (see 35 USC 103(a) rejection of claim 24 above).

### ***Response to Arguments***

Applicant's arguments filed 1/17/2006 have been fully considered but they are not persuasive.

Applicant's primary argument is that Rosvold does not teach nickel monosilicide with a platinum additive, but the examiner disagrees. Rosvold teaches (column 5; lines 33-42) that an alloy of nickel and platinum (disclosed in column 4, lines 47-53 to have a nickel concentration as high as 90%) combines with approximately equal amounts of silicon so that the ternary compound has a composition that is approximately 50% silicon. Nickel monosilicide ( $\text{NiSi}$ ), as opposed to nickel disilicide ( $\text{NiSi}_2$ ), has a composition that is approximately 50% silicon and 50% silicon.  $\text{NiSi}_2$  has twice the number of Si atoms as Ni atoms, so its overall composition is approximately two-thirds silicon and one-third nickel. Therefore, since Rosvold teaches a compound having 50% silicon, it is nickel monosilicide with a platinum additive.

### ***Allowable Subject Matter***

Claims 32 and 33 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: Prior art does not teach or suggest, in combination with the other claimed limitations, Ni monosilicide comprising at least one additive from the list claimed in either claim 32 or 33.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Heather A. Doty, whose telephone number is 571-272-8429. The examiner can normally be reached on M-F, 8:30 - 5:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached at 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 2813

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

had



CARL WHITEHEAD, JR.  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800